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ABSTRACT

Attitudinal and time data served as useful guides in providing feedback to modify a series of open-laboratory activities. The population for this study consisted of 80 undergraduate preservice elementary teachers enrolled in a science methods course. The attitudinal instrument used was the Activity Reaction Sheet. The students characterized the activities as: interesting, informative, of a medium difficulty level, presented in a likable format, well coordinated in a sequential manner, used materials and equipment appropriate for meeting stated objectives, and did not require extensive instructor assistance. The range of time for each exercise indicated that students do spend varying amounts of time on an exercise and supported the argument for an open-laboratory self-paced procedure. (Author/BB)

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THE USE OF STUDENT ATTITUDES AS A SOURCE OF FEEDBACK FOR MODIFYING A PRESERVICE ELEMENTARY SCIENCE METHODS COURSE

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Abstract *

The purpose of this two-year study was to use student attitudes as a source of feedback for modifying the open-laboratory component of a pre-service elementary science methods course. The emphasis of the open-laboratory component was the process orientation to science. Attitudinal questions dealt with seven parameters. Total time per student to complete an activity was also recorded.

Time data were used to modify four activities. The grand mean times were within the time frame set by the investigator.

Generally students (n = 120) characterized the series of activities as: interesting, informative, of a medium difficulty level, presented in a likable format, well coordinated in a sequential manner, used materials and equipment appropriate for meeting stated objectives, and did not require extensive instructor assistance.

*Virginia Journal of Science, 28(2): 88, 1977.

Introduction

A previous article in the Journal of Research in Science Teaching (Brown, 1977) reported the effect of process skill instruction on performance of preservice elementary teachers. This two year study was cognitively oriented. Concomitant to the cognitive study, the investigator gathered attitudinal and time data from students as they completed a series of open-laboratory activities. These data were used as guides in the revision of the process test and several laboratory activities.

Design and Method

Population

The population for the first part of the attitudinal study consisted of eighty undergraduate preservice elementary teachers enrolled in three sections of this investigator's science methods course, Spring Semester, 1973. Forty students in similar classes, Spring Semester, 1975, composed the population of the second part of the attitudinal study.

Instrumentation

The attitudinal instrument used was an Activity Reaction Sheet. Students responded to seven statements on a data-processing card using a scale continuum from one to five. The continuum was changed to one to four for the second assessment. The seven scales dealt with: (1) interest (2) new-old material (3) difficulty (4) method of presentation (5) sequence (6) materials and equipment and (7) assistance with the laboratory. An example of scale one will illustrate the procedure. If a student thought the exercise to be extremely dull, he would respond by marking the one on the data processing card; if he thought the exercise to be moderately dull, a

two would be marked; three would indicate a neutral feeling (eliminated in second assessment), four would indicate moderate interest; and five would indicate high interest. On the back of the card the student stated the total time it took him to complete the exercise.

Procedure and Analysis

Each student completing an exercise filled out a data processing card. The mean time was calculated for each exercise.

The responses to the seven attitudinal scales were summarized into three categories. Responses one and two were grouped, response three was left alone, and responses four and five were grouped. Responses to the second administration of the attitudinal scales were grouped one-two and three-four with the exception of the difficulty scale that was grouped one, two-three, four. No neutral scale was used.

Since the attitudinal component of the study was of a survey nature, the percentage reported may be interpreted only on a comparative basis; no absolute limits were established.

Results and Discussion

The results of the time and the attitudinal study components are summarized in a composite table (Table I).

The intent of this investigator was not to exceed a grand mean time of 120 minutes for each exercise. Although there was great variation in mean time among the exercises and a large range of time within each exercise, the grand mean time of 99 minutes and 108 minutes for the first and second assessments respectively did fall within the time limit anticipated. The range of time for each exercise indicates that students do spend varying

TABLE I
COMPOSITE OF TIME AND ACTIVITY
REACTION SHEET SCALES

Activity	Scales *							
	Time	Interest	Old-New	Difficulty	Method	Sequence	Materials	Assistance
Observing	**0	+	0	+	+	+	+	+
	***0	+	+	+	+	+	+	+
Space/Time Relationships - Shape	0	+	+	+	+	+	+	0
	0	+	+	+	+	+	+	+
Space/Time Relationships - Motion & Speed	-	0	+	-	-	0	+	0
	0	+	+	+	+	+	+	0
Classifying	-	0	0	+	0	+	+	+
	-	+	+	+	+	+	+	+
Numbers	+	0	-	+	+	+	+	+
				Not Apply				
Measuring	-	-	-	+	-	0	+	0
	-	+	+	+	+	+	+	+
Communicating	-	0	-	+	0	+	+	0
	-	+	+	+	+	+	+	+
Predicting	0	+	0	+	+	+	+	0
	-	+	+	+	+	+	+	+
Inferring	+	0	0	+	+	+	+	+
	0	+	+	+	+	+	+	+
Controlling Variables	+	0	0	+	+	+	+	+
	0	+	+	+	+	+	+	+
Interpreting Data	0	0	0	+	+	+	+	+
	0	+	+	+	+	+	+	+
Formulating Hypotheses	+	0	0	+	+	+	+	+
	+	+	+	+	+	+	+	+
Defining Operationally	+	+	0	+	+	+	+	+
	+	+	+	+	+	+	+	+
Experimenting	+	0	0	+	+	+	+	0
	0	+	+	+	+	+	+	+

Time	Reaction Scales
* - 120+ min.	30% or less
0 90-120 min.	31%-49%
+ 89- min.	50% or more

** First assessment
*** Second assessment

amounts of time on an exercise and supports the argument for an open lab., self-paced procedure.

The investigator has divided the time variable into three categories: over 120 minutes, between 90 and 120 minutes and less than 89 minutes (Table I). In both the first and second trials of the activities, only four activities exceeded the 120 minute guideline. In three of the four cases, the same exercises were involved. This time data provides the instructor with information useful in pacing his course to allow sufficient time for students to complete those exercises that require over 120 minutes.

The percent responses to the Activity Reaction Sheet scales were categorized into three sections: 30% or less, 31% to 49%, and 50% or more. "Desirable" responses were established as:

	Categories of Responses	
Scale	First Assessment	Second Assessment
(1) Interest	4-5	3-4
(2) New-old material	4-5	3-4
(3) Difficulty	3	2-3
(4) Method of presentation	4-5	3-4
(5) Sequence	4-5	3-4
(6) Materials & Equipment	4-5	3-4
(7) Assistance	1-2	1-2

In the first assessment, 54% responded in either column four or column five of the interest scale. Therefore, a + was recorded in Table I for this factor. In the second assessment of the same factor, 88% responded in either column three or in column four and a + was recorded in Table I.

The following four exercises were revised as a result of the first assessment: motion and speed, classifying, measuring, and communicating. The num-

bers exercise was eliminated. Additional data, which substantiate elimination of this exercise, are part of the cognitive study (Brown, 1977). Ninety-eight percent of the students answered a question concerning number lines correctly, and eighty-seven percent of the students could calculate the mean.

In the second administration of the Activity Reaction Sheet scales all values, with one exception, were rated as +(50% or more). The one exception was the assistance scale for Space/Time Relationships - Motion and Speed. In this case 51% of the students sought for and received assistance. It must be kept in mind that in the second administration, the neutral scale was eliminated. Students were forced to one end or the other of a four-point continuum. This was done in order to eliminate the all too common response of students to stay on the middle ground and select three's. With this shift in methodology kept in mind, the general conclusion can be reached that the majority of the students did hold the attitudes the investigator predetermined as being desirable.

Generally, students characterized the series of activities as follows:-

Interesting

Informative

Of a medium difficulty level

Presented in a likable format

Well coordinated in a sequential manner

Used materials and equipment appropriate for meeting stated objectives

Did not require extensive instructor assistance

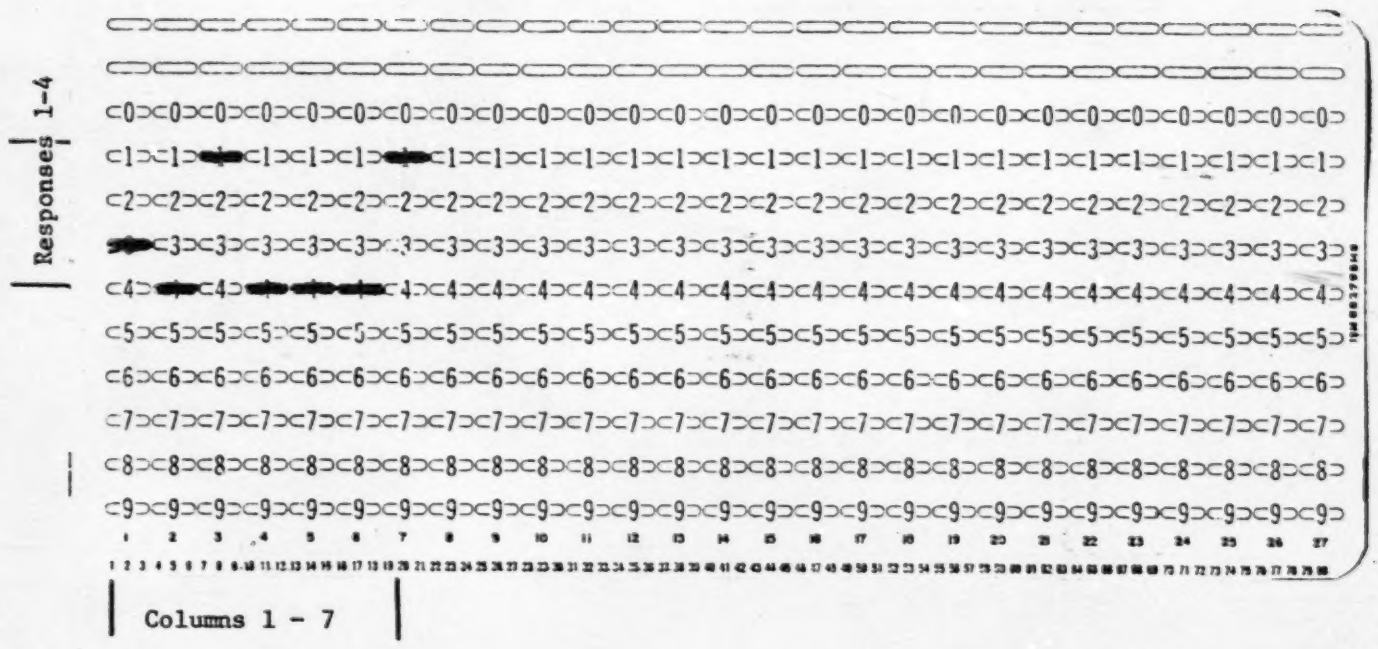
Additional attitudinal data relative to this study and the open-lab.

program were drawn from the general evaluation of the course administered the last day of the semester. The response categories were very bad-poor, fair, and good-excellent. Fifty-six students responded to the question concerning how they evaluated the open-lab. in general. Percent responses were: 12% very bad-poor, 25% fair, and 63% good-excellent. Fifty-seven students answered the question concerning evaluation of the class discussion of the laboratory exercises. Responses were: 5% very bad-poor, 35% fair, and 60% good-excellent. The percent of good-excellent ratings indicate that a substantial number of students evaluated the exercises and discussions, as a whole, as worthwhile.

The attitudinal and time data served as useful guides in providing the investigator with feedback to be used to modify a series of open-laboratory activities. These data, along with the results of the cognitive study, support the contention that prescience elementary teachers can provide useful feedback that will directly effect a component of a course they are required to take. This method of obtaining feedback can easily be used in the areas of a science methods course and in other content areas where an open-laboratory mode is used.

The combined studies, cognitive and attitudinal, provided research data as a decision making base. Curriculum modifications were made based on data rather than on personal philosophies and biased preferences.

ACTIVITY REACTION



This is not a test. It is a way in which I can obtain concensus on your reactions toward specific areas of the laboratory activities. Your judgement concerning various aspects of the activities will contribute to their ultimate improvement.

Below you will find a set of seven scales. For each scale place a dark pencil mark in the proper space on a computer card. Do not mark between the spaces. Be certain every scale is marked. Use separate, independent judgements for each scale. Work rapidly. I prefer your first impression as well as your true feelings for each assessment. Please feel free to add on the back of the card any comments you wish to make concerning these activities.

On the back of the card write: (See example on bulletin board)

1. Your name
2. Class hour
3. Professor's name
4. Three letter abbreviation for lab.
5. The total amount of time it took you to do the entire activity expressed in minutes.

On the front of the card use the first seven columns only. Make sure your response is marked in the proper space in the appropriate column. Use pencil only!

Scales:

1. Dull, tedious, thought of other things	1	2	3	4	Interesting, held my attention
2. Repeated what I already knew	1	2	3	4	Informative, presented new material
3. Too easy to follow, too elementary	1	2	3	4	Too difficult to follow, too advanced
4. I did not like this way of presenting the material	1	2	3	4	I liked this way of presenting the material
5. Did not fit in well with other lab. activities	1	2	3	4	Fit in well with other lab. activities
6. Materials and equipment not appropriate to the objectives of the activity	1	2	3	4	Materials and equipment appropriate for objectives of the activity
7. I never sought or received assistance during the activity	1	2	3	4	I sought for and received assistance during the activity

Example:

If you think that an activity was moderately interesting, very informative, very easy to follow, you liked the activity very much, it fit in well, materials were appropriate, and you never sought assistance, then your completed card should look like the one at the beginning of these directions.

Note:

Your laboratory activity will NOT be evaluated unless accompanied by a computer card filled-out COMPLETELY!

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